Time Travel

Grades: 3 and 4
Length: 50 minutes

South Dakota Content Standards

♦ 3rd Grade Life Science: Students will describe how species depend on one another and on the environment for survival.
♦ 3rd Grade Life Science: Students will explain reasons for the extinction of species.

♦ 4th Grade Life Science: Students will examine how the fossil record, which has occurred over time, provides evidence of change in organisms.
♦ 4th Grade Life Science: Students will describe behavioral and structural adaptations plants and animals have to survive in a given environment.

Primary Theme

The Badlands fossil and geological record reflects changing climates and the diversity of life; its study provides insight into the survival of species.

Objectives

Match fossilized animals to the three ancient environments in which they lived.

Identify Badlands National Park as a place that preserves fossils.

Materials

♦ Poster-sized pictures of the four Badlands environments (Modern Day Prairie, Western Interior Sea, Tropical Rainforest, and Oligocene Flood Plain)
♦ Props to match the posters (buffalo hair, deer antlers, coyote fur, baculite, ammonite, clam shell, titanothere, alligator, mesohippus, oreodont, saber-toothed cat, etc.)
♦ Slides and slide show (suggested script on page 37 in this packet)
♦ Pictures of reconstructed animals

Kick-off

Begin by prompting the students, "Paleontologists start with good observations, so I am going to ask you to make some important observations." Divide into teams of 3 or 4 students. Make sure there is table space between them. Place a variety of fossils on each table. Also put out something that is representative of the modern-day environment. Give the students time to make observations. Circulate through the groups encouraging to compare and contrast different fossils/props. Ask questions like, "Which do you think is fom a modern animal and which do you think is from an ancient animal?", "How did you know?", "What kind of environment do you think this animal lived in and why?", "What did this animal eat?", and "How do you know?"

Lead Discussion With Slide Show (suggested script on page 37)

Ask the students what they noticed about their fossils and/or animals parts. Differentiate between mammals and dinosaurs. Make a chart on the board if necessary. The slide show should compliment your theme - it is not simply a show and tell. Focus on how the animals were adapted to their different environments and what happened as the environment changed. Use the time travel idea by starting with the modern prairie and working backwards. This will support the next activity.

Activity

Arrange the environment posters chronologically along a "Walk Through Time." Say, "This first stop is at the modern prairie environment. Does anyone have something from an animal that lives here now?"Depending on your group management tactics, either choose a student to pull their prop on by the proper poster or collect the prop and place it yourself. Continue for each poster. Give students a chance to get up and go on the "Walk Through Time."

Test Their Knowledge

Have students close their eyes while you move a prop out of order. Model it once or twice, and then call on a student to move the prop back to the correct area. Or, show additional props/pictures of animals or plants and add them to the environment with help from the students.

Conclusion

Resource message: We call people who steal fossils "Thieves of Time." Each time a fossil is stolen, we lose information about that animal.

Suggested Slide Show Script

The Badlands of today are really neat - how would you like to climb through these rugged peaks? However, Badlands is not just these steep, mountain-like formations. There is a grassland, or prairie, environment that lots of plants and animals live in. These animals are pretty familiar to us and we love to watch the deer and the antelope roam across the prairie of today. These animals fit with the prairie - they are adapted to live here. For example, buffalo eat grass, have thick fur, and move around in herds. That works great on the prairie because there is plenty of grass and it is cold most of the year. Do you think a buffalo would live to live in the desert or a tropical rainforest? That is because all animals are adapted to live in a particular environment. Prairie dogs dig burrows and live underground - this is great for the prairie because there are no trees to live in, so they dig. Predators like coyotes and what else (bobcats, hawks, and badgers) also make a home here because they have what it takes to live in this environment.

Within these Badlands formations we were just talking about are clues to a time when these familiar animals did not live here. It was a strange and different world from what we see today. How do we know about this mystery world? We study evidence left behind from millions of years ago to figure out what it was like.

Now get ready and put on your seltbelt - we are about to take a wild ride back through time!

If we travel back in our imaginations 30 to 34 million years ago, then we would noticed things were quite different. The first thing you might notice is there are NO humans. Also, remember, the dinosaurs had already gone extinct. So right now we are in a time after dinosaurs and before people. Let's explore! What do you see? Right, there is a lot of grass and that is like today, but do you notice the trees? Trees need more water than grass to survive, so what does that tell you about this time? Yes, there was more water - rain and rivers. Now, what happened to these animals and this environment? Well, the climate was changing, as less and less rain fell, the trees died and were replaced by new grasses. Some of these animals couldn't survive in the new environment, so they went extinct.

Let's travel further back in time! What does this look like? Wow, if we go even further back in time, to say 35 to 37 million years ago, we see the environment was even wetter and warmer, like a tropical rainforest. Do any of these animals look familiar? Can you imagine alligators living in South Dakota today? No way, because the environment is not right for alligators.

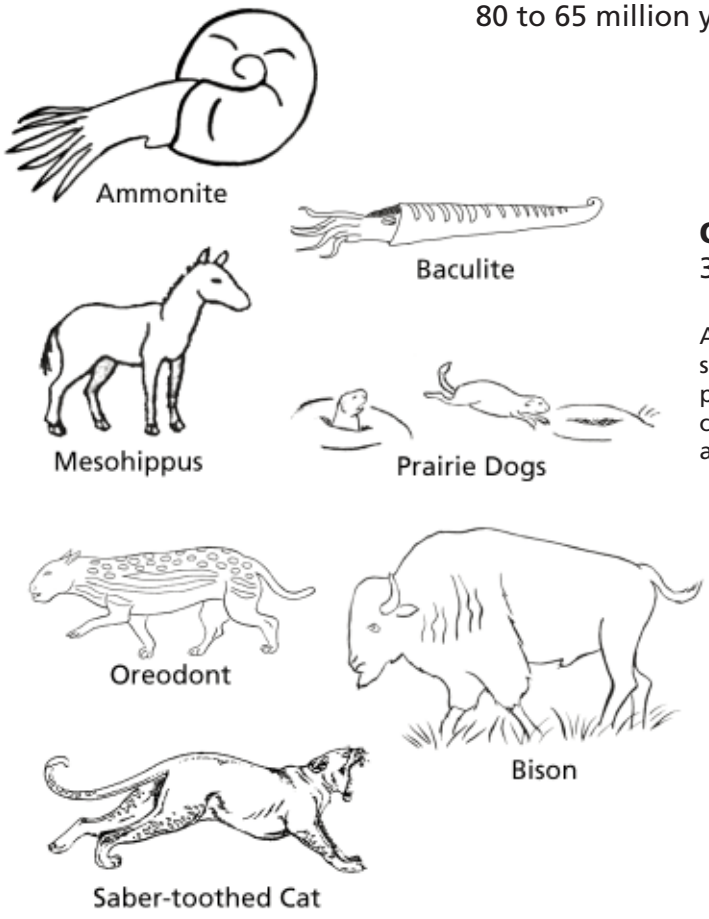
Buckle up! Here we go again! What! This CAN'T be South Dakota! What in the world? Well maybe these clues will help explain: a clam shell fossil and a fossil fish. They tell us that at one time a really, really long time ago - like 65 million years ago - there was an ocean here.

So Badlands National Park is a wonderful place to visit today, with lots of animals to see. Remember, it didn't always look like this and the clues to discovering what it was like so long ago are in the fossils.

Time Travel

Paleontologists piece together stories about ancient environments by studying the fossils of ancient animals. Some animals that once lived went extinct when the climate and environment where they lived changed.

Directions
Draw a line from the animal to the environment and time period it lived in.



Shallow Ancient Sea
80 to 65 million years ago

Oligocene Flood Plain
35 to 25 million years ago

A mild and moist climate supported a savanna-type environment that would periodically flood. Slowly over time, this climate bacame colder and drier. Some animals survived and some went extinct.

Mixed-grass Prairie
Modern day

A dry and harsh climate supports modern prairie animals.

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The future

What kind of ecosystem do you think might be here in the future?

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Fossils of the extinct oreodonts are found in Badlands National Park.

"Oreo" means mountain and "dont" means tooth. Oreodonts had pointy teeth, like little mountain ranges, to help them chew plants.

Oreodont teeth are very common fossils to find in the Badlands. What would you do if you found one?

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